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Research on College English Reading Teaching Based on TRIZ Theory

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Abstract: Reading comprehension ability is an important reflection of college students' overall English proficiency and is a key issue in the reform of college English teaching. In current college English reading instruction, students generally face problems such as a single reading strategy, insufficient information integration ability, and a lack of critical thinking and innovative awareness, which hinder the further improvement of reading comprehension skills. Based on this, the present study introduces TRIZ theory, a systematic innovation problem-solving method, and apply it to college English reading teaching practice. The study, conducted over one academic year with sophomore non-English major students at Lyuliang University, utilizes contradiction analysis, the segmentation principle, and the ideal final result principle to guide students in optimizing their reading strategies. The results show that the TRIZ-based reading teaching model helps students effectively tackle complex texts, improving their reading comprehension, critical thinking skills, and learning initiative. It has practical value and potential for broader application in the reform of college English reading teaching in local universities.

Keywords: TRIZ theory; College English reading; Teaching reform; Reading strategy; Innovative thinking.

1. Introduction

TRIZ (Theory of Inventive Problem Solving) was proposed by the Soviet scientist Genrich Altshuller. [1] It mainly aims to solve contradictions in technology and engineering through scientific and systematic methods. The core idea of TRIZ theory is to resolve problems through contradiction analysis and systematic approaches. [2] Other key principles of TRIZ include inventive principles, the segmentation principle, and the ideal final result principle, which provide innovative solutions to various types of problems.

In current college English teaching practice, reading instruction still mainly focuses on explaining vocabulary and grammar, and the classroom teaching methods remain relatively monotonous. When facing long and complex English texts, students often encounter difficulties such as failing to grasp the main idea of the passage, missing key information, reading without full comprehension, and making inaccurate inferences. Although some students possess a certain level of vocabulary and grammatical knowledge, they often fail to achieve deeper comprehension during reading. Due to the lack of effective reading strategies and critical thinking, it is difficult for them to develop the advanced reading abilities required for the College English Test Band 4 and Band 6 and for future professional English learning.

With the continuous deepening of college English teaching reform, how to improve the effectiveness of reading instruction within limited classroom time and how to enhance students' abilities to analyze and solve problems have become important issues that college English teachers must address. TRIZ emphasizes solving problems through contradiction analysis and systematic thinking. This concept closely corresponds to the contradictions encountered in college English reading, such as the contradiction between large amounts of information and limited comprehension ability, and the difficulty in balancing reading speed and depth of understanding. Therefore, applying TRIZ theory to college English reading instruction may provide a new theoretical perspective and methodological approach to addressing problems in reading comprehension.

Based on the above background, this study selects non-English majors at Lyuliang University as research participants and attempts to systematically integrate TRIZ theory into college English reading classes. Through a teaching experiment, the study aims to examine its practical effectiveness and provide practical experience that may serve as a reference for the reform of college English reading instruction in local universities.

2. Teaching Practice of College English Reading Based on TRIZ Theory

2.1. Teaching Participants and Materials

This study selected sophomore students majoring in Biological Science from the Department of Biological and Food Engineering of Lyuliang University (Class of 2023) as the participants of the teaching experiment. A one-academic-year teaching practice was conducted.

Two intact classes were selected as research samples. One class (38 students) served as the experimental group, where the TRIZ-based reading teaching model was implemented. The other class (37 students) served as the control group, where traditional reading teaching methods were adopted.

Students in this major generally possess a moderate level of English proficiency. They have a certain foundation in vocabulary and grammar, but show obvious deficiencies in long-text reading, information integration, and logical reasoning. Therefore, they are representative participants for this study.

2.2. Implementation of TRIZ Theory in Reading Instruction

The reading materials used in this study were mainly selected from Advanced College English for the New Era (Books 3 and 4) as well as reading comprehension passages from the College English Test (CET-4 and CET-6) over the past ten years. These texts often involve topics such as social issues, technological development, and cross-cultural

communication, and possess both critical and practical significance.

To gradually improve students' reading ability, the teaching materials were designed with a hierarchical structure in terms of difficulty and cognitive depth, progressing from basic comprehension to deeper analysis. On this basis, TRIZ theory was integrated into the teaching practice of college English reading.

In the experimental class, the reading instruction was guided by three key principles of TRIZ theory: contradiction analysis, the segmentation principle, and the ideal final result principle. Based on these principles, a reading teaching model consisting of four stages was constructed: contradiction identification – structural analysis – strategy optimization – integrated application. [3]

To demonstrate the practical application of this model in classroom teaching, the study selected the reading text "Shakespeare's Tragic Plays" from Unit 2 of Advanced College English for the New Era 4 as a teaching case. This text mainly introduces the characteristics of Shakespeare's tragedies, including universal themes, tragic heroes, and dramatic plot structures. It has a clear argumentative structure and typical features of expository texts, making it suitable as training material for college English reading instruction.

2.2.1. Contradiction Identification and Reading Context Introduction

In TRIZ theory, contradiction analysis is an important step in problem solving.[4] When reading this text, students often encounter a large amount of information and numerous characters and works, which easily leads them to adopt a sentence-by-sentence translation approach, thus affecting overall comprehension.

To address this issue, the teacher guides students to identify the main contradiction in the reading process: although the richness of information enhances the completeness of the content, it also increases the difficulty of comprehension. In class, the teacher first uses the title "Shakespeare's Tragic Plays" to guide students to predict the topic of the text, and then asks them to skim the first paragraph to determine that the passage mainly discusses the influence of Shakespeare's tragedies and the reasons for their popularity among audiences.

Through this process, students establish an overall cognitive framework at the initial stage of reading, which lays the foundation for deeper comprehension of the text.

2.2.2. Structural Analysis Based on the Segmentation Principle

The segmentation principle in TRIZ theory emphasizes dividing complex systems into several parts for analysis. [5] In reading instruction, the teacher demonstrates how to divide the text into different functional sections.

Specifically, the text can be divided into three parts:

The first two paragraphs introduce the reasons why Shakespeare's tragedies are widely appreciated and discuss universal themes such as love, hatred, jealousy, life, and death.

The second part analyzes the image of the "tragic hero" and character flaws through three representative works: Romeo and Juliet, Hamlet, and Macbeth.

The third part summarizes the characteristics of Shakespearean tragedy in terms of plot structure and dramatic presentation, including complex plots, intense conflicts, and tragic endings.

Through such structural division, students are able to better understand the overall logic of the text and recognize how the author supports the central argument with specific examples.

2.2.3. Independent Inquiry and Information Integration

Based on the teacher's demonstration, students conduct independent inquiry and information integration. In classroom activities, students are divided into groups to discuss the three main examples in the text: Romeo and Juliet, Hamlet, and Macbeth.

Students summarize the tragic themes and character traits reflected in each case. For instance, when analyzing Romeo and Juliet, students identify "forbidden love" as the central theme and understand the role of family conflict in shaping the characters' fate. In Hamlet, they discover that the tragic flaw of the protagonist lies in indecisiveness and lack of decisive action. In Macbeth, the tragedy stems from excessive ambition and the desire for power.

Through comparative analysis of these cases, students gain a deeper understanding of the concept of tragic flaw and recognize the importance of character traits in the development of tragedy.

2.2.4. Strategy Optimization Based on the Ideal Final Result Principle

In the final stage of instruction, the teacher guides students to summarize efficient reading strategies based on the Ideal Final Result (IFR) principle of TRIZ theory. This principle emphasizes solving problems in the most concise and effective way.

In reading instruction, this means that students should quickly extract core information from a text through titles, topic sentences, and keywords rather than relying on word-for-word translation.

During classroom demonstration, the teacher analyzes a paragraph about Romeo and Juliet. The sentence "Shakespeare's Romeo and Juliet is a timeless story of forbidden love" is used as an example. Students are guided to identify the keywords "timeless story" and "forbidden love" and recognize the sentence as the topic sentence of the paragraph. Through this process, students can quickly grasp the main idea of the paragraph and further understand how family conflict contributes to the tragic ending.

Through such training, students gradually develop structured reading habits, learning to identify titles, topic sentences, and keywords to grasp the main idea of a text and integrate information across paragraphs to understand the overall structure of the passage, thereby improving reading comprehension efficiency.

3. Evaluation and Reflection on Teaching Effectiveness

3.1. Evaluation of Teaching Effectiveness

To evaluate the effectiveness of the TRIZ-based reading teaching model, reading comprehension tests were conducted for both the experimental group and the control group before and after the experiment. The test used the reading comprehension section of a 2017 CET-4 mock examination, with a total score of 20 points, aiming to assess students' comprehensive reading ability.

Both groups took the tests at the beginning and the end of the semester, with a unified test duration of 20 minutes to ensure consistency. After each test, students completed a self-feedback questionnaire focusing on their perceived changes in reading comprehension ability and their acceptance of the TRIZ-based teaching method.

All tests were conducted as in-class quizzes to reduce students' test anxiety and ensure that they answered questions under normal learning conditions.

3.2. Data Analysis Methods

To analyze the experimental results, several statistical methods were used, including central tendency analysis, frequency distribution analysis, and variance analysis.

3.2.1. Central Tendency Analysis

The mean, median, and mode were calculated to describe the score distribution of the two groups. The results showed that the experimental group had a mean score of 12.8, a median of 12, and a mode of 12, while the control group had a mean score of 10.2, a median of 10, and a mode of 10. Overall, the experimental group outperformed the control group in all indicators, suggesting that the TRIZ-based teaching model improved students' overall reading performance.

3.2.2. Frequency Distribution Analysis

Score distribution charts were used to compare the concentration of scores in different score ranges. The results showed that about 35% of students in the experimental group scored above 12 points, while 41% of students in the control group were concentrated around 10 points. In addition, 34% of students in the experimental group fell within the high-score range of 16–18 points, compared with only 8% in the control group. This indicates that a higher proportion of students in the experimental group achieved high scores in reading comprehension.

3.2.3. Variance Analysis

Variance analysis was conducted to examine whether the difference between the two groups was statistically significant. The results showed a significant difference between the two groups ($p < 0.05$), indicating that the TRIZ-based reading teaching model can effectively improve students' reading comprehension performance.

4. Results Analysis and Discussion

4.1. Improvement of Reading Comprehension Ability

The experimental results show that integrating TRIZ theory into college English reading instruction can improve students' reading comprehension ability to a certain extent. Through contradiction analysis, students gradually recognize the contradiction between large amounts of information and limited comprehension ability, thus shifting from sentence-by-sentence translation to a more holistic reading approach focusing on overall structure and key information.

The segmentation principle helps students divide complex texts into structural units and understand the logical relationships among paragraphs. The ideal final result principle encourages students to extract key information quickly through titles, topic sentences, and keywords, thereby improving reading efficiency.

Overall, TRIZ theory provides students with a structured approach to reading, which contributes to the improvement of reading comprehension ability.

4.2. Enhancement of Critical Thinking

Under the guidance of TRIZ theory, students gradually develop the habit of analyzing and comparing textual information during reading. Through analyzing different cases and textual evidence, students are able to understand not only the surface meaning of a text but also the deeper implications of the author's ideas.

In classroom discussions and case analysis activities, students actively express their own interpretations and judgments based on textual evidence, which contributes to the development of critical thinking ability. [6]

4.3. Strengthening of Autonomous Learning Awarenes

The study also found that the TRIZ teaching model stimulated students' learning interest and enhanced their awareness of autonomous learning. Through participation in discussions and analytical activities, students gradually mastered reading strategies and began applying them in extracurricular reading.

Some students voluntarily practiced additional reading after class and attempted to understand texts by identifying structure and keywords. This shift in learning behavior indicates that TRIZ theory not only improves reading ability but also promotes the development of autonomous learning habits.

5. Summary

The teaching practice demonstrates that integrating TRIZ theory into college English reading instruction provides a new approach for optimizing reading teaching models. Through contradiction analysis and systematic reading training, students gradually master strategies for dealing with complex texts, which improves both their reading comprehension ability and reading confidence.

At the same time, this teaching model emphasizes problem analysis and structured thinking, which helps cultivate students' divergent thinking and innovative awareness. This aligns with the current goal of higher education to cultivate interdisciplinary and innovative talents.

However, the application of TRIZ theory in college English reading instruction still has certain limitations. For example, differences in cognitive styles and learning needs among students from different majors may influence the applicability of TRIZ theory. In particular, further exploration is needed on how to integrate TRIZ theory with disciplinary learning for science and engineering students.

In addition, classroom time allocation and instructional design need continuous adjustment in future teaching practice. Overall, the TRIZ-based reading teaching model shows promising potential in improving students' reading ability and thinking skills and provides useful insights for the reform of college English reading instruction in local universities.

Conflicts of interest

The authors declare that they have no conflict of interest.

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